## Remarks

By this Amendment, Applicants have amended claims 21, 23, 30, 33, 34, 37 and 40. The Examiner withdrew independent claim 21 and corresponding dependent claims 22-26, 29 and 30 from consideration; however, as discussed below, Applicants have amended independent claim 21 (and claim 23) to address the Examiner's reason for withdrawal and, therefore, request reinstatement of these claims.

Concurrently with the submission of this Amendment, Applicants submit a Declaration Under 37 C.F.R. § 1.132 made by David J. Gross of Dominion Engineering ("Gross Declaration"). Applicants also concurrently submit with this Amendment, formal drawings.

The Examiner's comments and rejections in the Office Action mailed on July 20, 2004 are addressed below in the order presented in the Office Action.

## I. Withdrawal of Claims 21-26, 29 and 30

The Examiner has withdrawn claims 21-26, 29 and 30 because the claims recite a housing configured for mounting to a floor, which, the Examiner contends, does not fall within the elected species. Accordingly, Applicants have amended independent claim 21 (and dependent claim 23), from which claims 22-26, 29 and 30 depend, by deleting this element. As such, these claims clearly fall within the elected species, and Applicants request reinstatement of these claims.

Regarding the patentability of these claims, it is useful to review their prosecution history.[1] The Examiner rejected an earlier form of these claims under 35 U.S.C. § 103(a) based upon U.S. Pat. No. 5,467,791 ("Kato") in view of U.S. Pat. No. 5,200,666 ("Walter"). In response, Applicants argued that Kato only teaches the use of planar transducers and that one of skill in the art would not be motivated to replace the planar transducers of Kato with the transducers taught by Walter nor would one of skill in the art have an expectation of success in such combination. (See Applicants' Amendment filed October 9, 2003 in response

[1] Applicants note that the Examiner has previously rejected claim 30 only on the basis of obviousness-type double patenting. (See Office Action mailed December 9, 2003.) Since claim 30 is dependent upon independent claim 21, however, it is included in this discussion as the arguments herein apply equally to this claim.

to the Office Action mailed June 9, 2003.) In the following final Office Action (mailed December 9, 2003), the Examiner maintained this rejection and asserted that Applicants' reading of Kato did not illustrate that only planar transducers were taught. Applicants then filed a Request for Continued Examination and amended independent claim 21 to recite that the housing had a length at least as long as the irradiated nuclear fuel assembly and that the housing was configured for mounting to a floor. As noted, in the current Office Action the Examiner withdrew these claims based upon this latter limitation as not being within the scope of the elected species but, therefore, did not directly address the limitation of the housing's length.

Independent claim 21 now recites an elongated housing having a length at least as long as the irradiated nuclear fuel assembly, and Applicants assert that neither Kato nor Walter, alone or in combination, teach or suggest such a housing. While the length of the claimed housing is defined relative to the fuel assembly, such is clearly a structural limitation and is not a statement of intended use. Further, one of skill in the art when reading the present specification would clearly appreciate the meaning of the term "elongated". In addition, the plain meaning of this term can be taken from the American Heritage College Dictionary, 3rd ed., which defines "elongate" to mean "having more length than width".

Kato, on the other hand, teaches a transducer translating mechanism 110 that holds the transducers 111. (See Kato, Fig. 5 and col. 6, lines 7-21.) As clearly shown in Kato, the fuel assembly has a length much greater than the height of the transducer translating mechanism, which actually appears to have more width than length and, at best, is square. (See Kato, Fig. 7.) Therefore, Kato fails to show either an elongated housing or a housing having a length at least as long as the fuel assembly. Walter, similarly, does not teach or suggest any such elongated housing or a housing length at least as long as the fuel assembly.

With respect to the Examiner's discussion of short fuel assemblies, (albeit in connection with the rejection of claims 31, 32 and 37-39 and in the context of movement of the Kato apparatus), the combination of these references with Kato does not make a prima facie case of obviousness with respect to the claimed housing length. First, Kato does not teach or suggest a housing having a length as long as the fuel assembly. The Examiner's citation to the existence of short fuel assemblies fails to provide any motivation for combining the teaching of Kato (i.e., a transducer translating mechanism that moves along a fuel assembly) with such a short fuel assembly, assuming *arguendo*, that a fuel assembly as short as Kato's apparatus exists. Such a motivation does not exist since Kato's apparatus is

designed to move along the length of a much longer fuel assembly, whereas the combination of Kato's apparatus with a fuel assembly as short as Kato's apparatus would result in Kato's apparatus operating in a stationary position. Such modification of Kato would change the entire principal of operation of Kato, which is impermissible when combining references. Again, Kato teaches a transducer translating mechanism 110 that is moved over the entire length of the fuel assembly—the transducer translating mechanism in combination with the transducers 111 is simply shorter than the fuel assembly, and Kato is silent as to the relative lengths of the housing for the transducers and the fuel assembly received by the housing.

Applicants also direct the Examiner's attention to the discussion below in connection with claims 31, 32 and 37-39 in which Applicants rely upon the Gross Declaration to illustrate that Kato only teaches the use of planar transducers and that one of skill in the art would not be motivated to replace the planar transducers of Kato with the transducers taught by Walter, nor would one of skill in the art have an expectation of success in such combination. This discussion applies equally to claims 21-26, 29 and 30.

In summary, the cited references fail to show the claimed elongated housing and length as recited in independent claim 21. Further, as discussed below, Kato and Walter fail to suggest a motivation to combine their teachings, and there is lack of an expectation of success in their combination. Therefore, Applicants believe that claims 21-26, 29 and 30 are in condition for allowance, and the same is requested.

## II. The 35 U.S.C. § 112 ¶1 and ¶2 Rejections

The Examiner has rejected claims 34-36 under 35 U.S.C. § 112 ¶1 for failing to comply with the enablement requirement and the written description requirement. In addition, these same claims have been rejected under 35 U.S.C. § 112 ¶2 as failing to comply with the written description requirement and as being indefinite. In light of the amendment made to independent claim 34, from which claims 35 and 36 depend, Applicants request withdrawal of these rejections.

Claim 34 has been amended to recite that at least one transducer is adjacent to one side of the irradiated nuclear fuel assembly, a second transducer is adjacent to the second side of the irradiated nuclear fuel assembly, a third transducer is adjacent to the third side of the irradiated nuclear fuel assembly, and a fourth transducer is adjacent to the fourth side of the irradiated nuclear fuel assembly. Support for this limitation is clearly shown in Fig. 11, which illustrates a top view of a four-sided nuclear fuel assembly and the tops of four

transducers, each one adjacent to a respective side of the nuclear fuel assembly. Applicants believe that this amendment rectifies the rejections made and requests withdrawal of these rejections.

## III. Drawings

The Examiner objected to the drawings under 37 C.F.R. § 1.83(a), requiring that the drawings must show every feature of the invention specified in claims 34-36. The Examiner has suggested that corrected drawing sheets may be submitted or that the features in these claims can be canceled. In light of the amendment made to independent claim 34 as described above, Applicants request withdrawal of these rejections.

## IV. The 35 U.S.C. § 103(a) Rejections

### A. Rejection of Claims 31, 32 and 37-39: Kato in View of Walter

The Examiner has rejected claims 31, 32 and 37-39 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 5,467,791 ("Kato") in view of U.S. Pat. No. 5,200,666 ("Walter"). Applicants note that the Examiner previously rejected claims 31, 32 and 37-39 only under the doctrine of obviousness-type double patenting, to which Applicants submitted a Terminal Disclaimer with their Request for Continued Examination. The Examiner now rejects these claims based Kato and Walter stating that it would have been obvious to modify the apparatus of Kato with the transducers taught by Walter.

Applicants traverse this rejection on multiple grounds. First, Applicants contend that neither Kato nor Walter, alone or in combination, teach each and every element of the invention claimed in independent claims 31 and 37, from which claims 32, 38 and 39 depend. In particular, Applicants' contend that these references do not teach or suggest the housing structure recited in these claims or the recited wave node structure. Second, Applicants contend that there is no motivation to combine Kato and Walter, nor would one of skill in the art have a reasonable expectation of success in such combination. Each of these two arguments are discussed in more detail immediately below.

1. **Neither Kato nor Walter teach or suggest an elongated housing or a housing having a length at least as long as the irradiated nuclear fuel assembly as recited in independent claims 31 and 37, respectively, or the node structure that is an approximate multiple of the spacing between the fuel rods of the fuel assembly.**

Independent claim 31 recites an "elongated housing". As discussed above in connection with claim 21, neither Kato nor Walter teach or suggest such an elongated housing. Kato teaches a transducer translating mechanism 110 that moves the transducers along the length of the fuel assembly. This mechanism is only as long as the transducers themselves and is not elongated. In fact, Kato's device actually appears to have more width than length and, at best, is square. (See Kato, Fig. 7.)

Similarly to independent claim 21 discussed above, independent claim 37 also recites an housing having a length at least as long as the irradiated nuclear fuel assembly. Again, neither Kato nor Walter teach or suggest a housing that has a length that is as long as the fuel assembly to be received by the housing. Kato only teaches the use of the transducer translating mechanism, which is clearly much shorter than the fuel assembly and is why it is designed to traverse the length of the fuel assembly.

Further, both claims 31 and 37 recite omnidirectional transducers that produce energy waves having a node structure that is an approximate multiple of the spacing between the fuel rods of the fuel assembly that is received by the housing. The Examiner concludes that omnidirectional transducers having such a node structure (*i.e.*, a structure that is a multiple of the spacing between the fuel rods) would be used because such is no more than the well-known type and configuration of ultrasonic transducers for cleaning nuclear fuel components. However, the Examiner has not provided any references to support this conclusion. Specifically, the Examiner has not provided any references that teach or suggest selecting transducers that have a node structure that is a multiple of the spacing between the fuel rods in an assembly to be received by the housing holding the transducers. Applicants submit that such conclusion may be the impermissible use of hindsight based upon Applicants' specification and teaching of this aspect of the invention.

Based on the foregoing, neither Kato nor Walter, alone or in combination, teach or suggest the respective housings or the node structure recited in claims 31 and 37. Applicants believe that independent claims 31 and 37, and corresponding dependent claims 32, 38 and 39 are, therefore, in condition for allowance, and withdrawal of this rejection is requested.

2. **There is no motivation to combine Kato and Walter, nor would one of skill in the art have a reasonable expectation of success in such combination.**

Applicants have previously argued that the specification of Kato makes it clear that only the use of planar transducers are taught. (See Applicants' Amendment filed October 9, 2003 in response to the Office Action mailed June 9, 2003.) In the current Office Action, the Examiner states that Kato does not specify or limit the transducers to planar transducers. Further, the Examiner states that Applicants' previous arguments had no probative value because they only represented an opinion and were not in the form of an affidavit or declaration. Third, the Examiner states that Kato does not state that omnidirectional transducers would not work.

In response to the Examiner's contentions, Applicants submit the Gross Declaration, which is a declaration made by Mr. David Gross, who is clearly skilled in the art based upon his expertise and experience. (See Gross Decl., paragraphs 1-3.) Specifically, the Gross Declaration is used to attest to the facts that (i) Kato teaches *only* the use of planar transducers and (ii) the apparatus taught by Kato is, therefore, designed only for planar transducers, and omnidirectional transducers would not be used in such an apparatus. In other words, one of skill in the art would not be motivated to combine Kato and Walter, nor would one of skill in the art have a reasonable expectation of success in such combination. Each of these points is discussed below.

a. **Kato only teaches the use of planar transducers.**

To provide a basis for the interpretation of the teachings of Kato, the Gross Declaration at Paragraph 11a) describes the differences between planar transducers and omnidirectional transducers. Notably, planar transducers generate energy waves that travel in a single direction from the active face and are typically depicted graphically as rectangles. To the contrary, omnidirectional transducers generate waves that travel in all directions and have nodes and anti-nodes resulting in a range of energy being emanated. Omnidirectional transducers are also rod-shaped.

Based upon these differences, Paragraphs 11b) through 11f) cite to various portions of Kato to support the conclusion that Kato teaches only the use of planar transducers. For example, Paragraph 11b) identifies Kato's description of the ultrasonic waves being incident at right angles to the channel box, concluding that this description only makes sense in the context of planar transducers since waves from omnidirectional transducers cannot be incident at right angles to any flat surface. Similarly, Paragraph 11c) points to a portion of

Kato that describes wave intensity at different portions of the transducers (*i.e.*, "edge" and "middle") that would only make sense in the context of planar transducers since "edge" and "middle" portions would not be associated with omnidirectional transducers. Paragraph 11d) illustrates that the transducer energy described by Kato is that of planar transducers. Kato describes transducer energy of "at least 1 $W/cm^2$" whereas, transducer energy for omnidirectional transducers is expressed in W/l or W/gal. Also, omnidirectional transducers produce waves that exhibit nodes and anti-nodes in which the nodes have a surface energy of 0 $W/cm^2$, which is incongruent with Kato's description of the energy being 1 $W/cm^2$. Paragraph 11e) notes that the drawings of Kato illustrate planar transducers rather than omnidirectional transducers. Paragraph 11f) notes that in a reference cited by Kato, only planar transducers are described. Since Kato does not make note of any particular problem with planar transducers, and because most transducers at the time were of the planar type, it is reasonable to infer that Kato only used planar transducers. For all of these reasons, the Gross Declaration concludes that Kato only teaches the use of planar transducers.

**b. <u>Omnidirectional transducers would not be used in Kato's design.</u>**

Based upon Kato only teaching planar transducers, the Gross Declaration also concludes that the design of Kato's apparatus is only for use with planar transducers and that one would not simply substitute an omnidirectional transducer into an apparatus designed for planar transducers. Paragraph 11g) notes that comparing planar transducers and omnidirectional transducers is a little like comparing apples and oranges, particularly in light of the differences between these transducers as discussed in Paragraph 11a). Therefore, one of skill in the art would not simply substitute one type of transducer for another, as it would be contrary to standard practice in the industry to do so.

Paragraph 11g) also notes that the design of the apparatus in which the transducers are used is based, at least in part, on the type of transducer, since the characteristics of the transducers will affect the overall design. For example, an apparatus designed for planar transducers would take into account that only planar waves will be generated by the transducers. Whereas, an apparatus designed for omnidirectional transducers would similarly take into account the fact that waves will be generated in all directions from the transducers. Paragraph 11g) makes it clear that one of skill in the art would not then simply take an apparatus designed for planar waves, such as the apparatus of Kato, and substitute omnidirectional transducers. To further support this fact, Paragraph 11g) explains that the

use of omnidirectional transducers in the apparatus of Kato would result in a loss of energy and inefficiency due to the use of the reflector in Kato, which is not appropriate for use with omnidirectional transducers.

The Gross Declaration concludes in Paragraph 11 that since Kato only teaches planar transducers and an apparatus for planar transducers, one would not be motivated to combine such an apparatus with omnidirectional transducers as taught by Walter, nor would one have an expectation of success in such a combination.

**3. Conclusion**

None of the cited references teach or suggest the housing as recited in independent claims 31 and 37, nor do they teach or suggest the recited node structure of the omnidirectional transducers. Moreover, based on the Gross Declaration it is evident that there is no suggestion in either Kato or Walter to combine these references, particularly given that Kato only teaches the use of planar transducers and is designed for use with planar transducers. Moreover, one of skill in the art would not have a reasonable expectation of success in the combination of Kato and Walter since the use of omnidirectional transducers in the apparatus designed for planar transducers would, for example, result in a loss of energy, which is something that one of skill in the art would avoid. Furthermore, as attested to by the Gross Declaration, one of skill in the art simply does not substitute one type of transducer for another in an apparatus designed for one type. Such is not standard practice and is contrary to accepted wisdom, and the mere fact that these references may be combined is not enough to evidence either a motivation to combine the references or an expectation of success therein.

Therefore, Applicants believe that independent claims 31 and 37, and corresponding dependent claims 32, 38 and 39, are in condition for allowance, and withdrawal of this rejection is requested. Applicants also suggest that the foregoing analysis applies to independent claim 21 and corresponding dependent claims 22-26, 29 and 30 and serves as a basis for allowability of those claims.

**B. Rejection of Claims 31, 32 and 37-39: Smith in View of Walter**

The Examiner has rejected claims 31, 32 and 37-39 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 5,337,446 ("Smith") in combination with Walter. The Examiner asserts that Smith teaches all of the elements of these claims except for the use of

omnidirectional transducers. The Examiner asserts that it would be obvious to modify the apparatus of Smith by the teaching of Walter. Applicants traverse this rejection.

Neither Smith nor Walter teach or suggest each and every element of independent claims 31 and 37. These claims recite that each omnidirectional transducer produces energy waves having a node structure that is an approximate multiple of the spacing between the fuel rods of the irradiated nuclear fuel assembly. More specifically, these claims recite a housing that is configured to receive an irradiated nuclear fuel assembly comprising a plurality of fuel rods and a spacing between each of the fuel rods. The node structure is then recited as being a multiple of the spacing between these fuel rods. Therefore, omnidirectional transducers are selected such that they have a node structure that provides this multiple based upon the fuel rod spacing of the fuel assembly that is received by the housing. Neither Smith nor Walter, alone or in combination, teach or suggest the use of omnidirectional transducers that have a node structure *that is an approximate multiple of the spacing between the fuel rods of the fuel assembly*. Such a node structure is not taught or suggested by these references because neither of these references address the cleaning of a nuclear fuel assembly.

The Examiner concludes that omnidirectional transducers having such a node structure (*i.e.*, a structure that is a multiple of the spacing between the fuel rods) would be used because such is no more than the well-known type and configuration of ultrasonic transducers for cleaning nuclear fuel components. However, the Examiner has not provided any references to support this conclusion. Applicants submit that such conclusion may be the impermissible use of hindsight based upon Applicants' specification and teaching of this aspect of the invention.

Applicants also suggest that independent claims 21, 31 and 37 are patentable over the combination of Smith and Walter, since Smith clearly teaches the use of planar transducers, and one of skill in the art would not be motivated to combine these references. To support this conclusion, Applicants refer to the Gross Declaration in which it is concluded that Smith teaches the use of planar transducers. (See Gross Decl., paragraph 12.) Specifically, Fig. 3 of Smith illustrates sonic plates that emanate waves in a single direction. (See Gross Decl., paragraph 12b.) Since omnidirectional transducers generate waves in all directions, such transducers are not used to focus energy waves at a single point in the same manner as taught by Smith. (Id.) Therefore, one of skill in the art would not be motivated to substitute the transducers taught by Walter in the apparatus of Smith. Nor would one of skill in the art have an expectation of success in such combination since omnidirectional transducers emanate

waves in all directions, whereas the purpose of Smith is to focus the energy in the center of the circular apparatus.

### C. Rejection of Claims 33-36 and 40: Kato in View of Walter

The Examiner has rejected claims 33-36 and 40 under 35 U.S.C. § 103(a) as being unpatentable over Kato in view of Walter. The Examiner alleges these claims are obvious based upon the combination of Kato's reflector around the housing and Walter's omnidirectional ultrasonic transducers. Applicants traverse this rejection in light of the amendment to these claims.

Claims 33, 34 and 40 have been amended to recite *circular* cylindrical inner and outer reflectors, and claims 33 and 34 have been amended to recite an air gap between these reflectors, as originally recited in claim 40. Neither Kato nor Walter, alone or in combination, teach or suggest each and every element of claims 33, 34 (from which claims 35 and 36 depend) or claim 40. Neither Kato or Walter teach or suggest a *circular* cylindrical inner reflector, a *circular* cylindrical outer reflector positioned around a periphery of the inner reflector and an *air gap* in between the reflectors. The Examiner refers to item 131 in Figures 6-9 of Kato; however, this structure clearly depicts a rectangular shape, not a circular one. Nowhere in Kato's specification does it describe a circular cylindrical reflector.

Further, while the Examiner refers to the structure 131 of Kato as a reflector, the structure is, in fact, referred to as a "ultrasonic wave leakage preventing structure" that is a mesh material that simply prevents the passage of the waves beyond its perimeter, in essence dissipating the wave. (See Kato, col. 9, line 63 – col. 10, line 21.) Therefore, even taking into consideration the steel housing of Kato in combination with this surrounding mesh material, such cannot be deemed to be two circular cylindrical reflectors. Moreover, such cannot be deemed to be two circular cylindrical reflectors having an air gap between them as recited in claims 33, 34 and 40.

The Examiner contends the inner and outer reflectors with a gap between them is a matter of optimization within prior art conditions or through routine experimentation. In this case, however, the Examiner has not shown any prior art that teaches the claimed inner and outer reflectors and gap. The section of the MPEP cited by the Examiner references In re Aller and states that "where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation". (In re Aller, 220 F.2d 454, 105.) While this law only addresses optimization of ranges, such as

temperature or concentration of chemicals, and does not address structural elements, for the sake of argument, it is clear that the prior art must at least illustrate the "general conditions" of the claim before concluding that the optimal or workable ranges for that portion are not inventive. Assuming, *arguendo*, that this law applies to structural elements, the Examiner must at least identify prior art that shows the general structure of the claim element before concluding that the specifics of the structural element would be the result of routine experimentation or optimization. In the present case, however, none of the prior art illustrates anything close to the claimed reflector. The prior art fails to even teach two reflectors, one outside of the other, let alone inner and outer circular cylindrical reflectors having an air gap between them. Therefore, the Examiner's contention is tantamount to reading teachings into the prior art that do not exist.

The Examiner also contends that the "dual reflector configuration is a mere duplication of parts that has no patentable significance unless a new and unexpected result". The use of two reflectors, however, is not a mere duplication of parts. It is necessary to have both reflectors to provide the air gap between them. The air gap is important in the overall working of the reflector structure. Therefore, both reflector surfaces are required and are not merely duplication.

Lastly, for the same reasons discussed above in connection with independent claims 31 and 37, neither Kato nor Walter teach or suggest the recited housing structure or the recited nodal structure. Since claims 33 and 40 depend from these independent claims, these dependent claims are allowable as well.

In conclusion, Applicants submit that neither Kato or Walter, alone or in combination teach or suggest claims 33-36 or 40. Therefore, Applicants request withdrawal of this rejection.

## V. Conclusion

In view of the above considerations, Applicants respectfully request a timely Notice of Allowance in this application. The Examiner is invited to call the undersigned attorney if a telephone call could help resolve any remaining items.

At this time, Applicants believe that no other fees are due other than those authorized in the concurrent submissions herewith, such as the Request for Extension of Time. However, please charge any additional required fee to Morgan, Lewis & Bockius LLP

Deposit Account No. 50-0310 (order no. 060825-0306 US). A copy of this sheet is enclosed for this purpose.

Respectfully submitted,

Date: January 19, 2005 By: _____ 40,756

David R. Owens Reg. No.

**Morgan, Lewis & Bockius LLP**
2 Palo Alto Square
3000 El Camino Real, Suite 700
Palo Alto, California 94306
(650) 843-4000